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Are the healers healthy? Exploring noncommunicable diseases among healthcare workers in Ajman, United Arab Emirates



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Abstract

Background Non-communicable diseases (NCDs), particularly cardiovascular diseases, are a major cause of global mortality. In the Gulf Cooperation Council (GCC) nations, healthcare workers face increased risks of obesity, hypertension, and diabetes due to lifestyle-related behaviour. This study evaluates the frequency and determinants of NCDs among healthcare workers in Ajman, UAE.

Methods A self-administered questionnaire was used in this cross-sectional study covering socio-demographics, lifestyle factors, perceived stress, and self-reported personal and family history of NCDs. A convenience sampling technique was used to recruit 786 healthcare workers at tertiary hospitals in Ajman. NCDs included diabetes, hypertension, cardiovascular diseases, obesity, hyperlipidemia, cancer, respiratory diseases, GERD, arthritis, piles, gout, sciatica, musculoskeletal disorders, and thyroid disorders. Ethical approval (IRB-COM-STD-25-JAN-2024) was obtained, and informed consent was ensured. Data were analyzed using IBM[®] SPSS version 29.0, with descriptive statistics summarizing variables and Chi-square tests assessing associations between NCD frequency and related factors with statistical significance set at p < 0.05.

Results The mean age of the participants was 35.04 ± 9.93 years. The frequency of non-communicable diseases among the study population was 273 (35%), with hypertension taking the lead. Significant associations were found between age, education level, nationality, Body Mass Index (BMI) levels, family history of NCDs, sleep habits, and NCD prevalence. Higher rates of NCDs were observed among older individuals 120 (56.9%), those with higher education levels 78(49.4%), abnormal BMI levels 189(43,1%), individuals from the Southeast Asia Region 184(32.5%), and those with a family history of NCDs 215 (37.9%). Adequate sleep 243(33.3%), feeling well-rested 237(33.5%), and no daytime sleepiness 78(29.2%) were linked to lower NCD prevalence, while snoring 156(48%) and muscular pain 167(45.3%) were associated with higher rates. A significant association was found between NCD prevalence and the consumption of salty 56 (43.4%) and spicy foods 43(52.4%), with higher prevalence in those consuming them less frequently or not at all.

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Conclusion Non-communicable diseases were prevalent (35%) among healthcare workers in Ajman, UAE, with hypertension being the most common. NCD clustering was observed, with multiple conditions coexisting in several participants. Both modifiable (BMI, sleep habits, diet) and non-modifiable (age, nationality, family history) risk factors showed significant associations with NCDs. Targeted lifestyle interventions and early screening are essential to reduce NCD risk in this population.

Keywords Non-communicable diseases, Healthcare workers, BMI levels, Family history, Diet, Sleep, Lifestyle united Arab Emirates

Introduction

The World Health Organization (WHO) reports that Non-Communicable Diseases (NCDs) contributed to over 43 million deaths annually, across the globe in 2021, accounting for over 75% of non-pandemic deaths globally. Statistics highlight that cardiovascular diseases cause more fatalities than any other NCDs. NCDs are chronic diseases that arise from a plethora of genetic, physiological, environmental, and behavioural factors. Educating and enlightening the public about NCDs is vital, as these diseases affect a diverse population regardless of age, location, or gender [1]. Various isolated studies have been carried out in various countries, despite the lack of comprehensive worldwide research assessing the death and morbidity rates among healthcare providers. These studies demonstrate the growing prevalence of non-communicable diseases (NCDs) among healthcare professionals, highlighting the critical need for occupational health treatments to improve workers' well-being and preserve the effectiveness of the healthcare system. Addressing these concerns is crucial given the increased frequency of NCDs among healthcare workers, labor shortages, and worldwide healthcare expenses of \$9.8 trillion (10.3% of global GDP) [1, 2]. Understanding the NCD load in this group is crucial because the health of healthcare professionals has a direct influence on the quality of patient treatment and the overall functioning of the system. Maintaining efficient healthcare delivery requires putting healthcare workers' health first because of their critical role in managing and preventing disease [3].

Healthcare workers are no exception to these risk factors and some studies have also pointed out that they suffer from higher rates of obesity, diabetes, hypertension and other chronic conditions. Research conducted by Silvana et al. in the United States demonstrated that NCDs accounted for 80.7% of deaths in 2019, with cardiovascular-related fatalities being the most prevalent [4, 5]. Obesity is linked to significant health risks and the potential development of chronic conditions over time. A five-year study conducted among healthcare professionals revealed a high prevalence of obesity within the group, raising concerns due to the consequent absenteeism from service provision. Additionally, obesity has been correlated with a heightened risk of developing cancer [5–7]. Another significant contributor to cancer is the consumption of alcohol and tobacco usage. In 2016, Shield and colleagues reported approximately 80,000 cancer-related deaths attributable to alcohol consumption in Europe. Additionally, tobacco smoking has been recognized as a primary risk factor for cancer in France [7, 8]. Another research indicated that healthcare providers indulge in alcohol and tobacco as a coping mechanism to tackle work-induced burnout [9].

The Gulf Cooperation Council (GCC) countries demonstrate a high frequency of risk factors associated with sedentary lifestyles, which contribute heavily to the intensity of NCDs. According to a 2021 report by the International Diabetes Federation, Kuwait has the highest prevalence of diabetes among GCC nations at 25.5.0%, while Bahrain has the lowest at 9.0% [10]. A study conducted among physicians in Saudi Arabia found that nearly 70% had a BMI exceeding 25, indicating a high prevalence of obesity or being overweight. Additionally, these physicians exhibited elevated rates of hypertension, diabetes, and dyslipidemia [11]. The findings suggest that the poor lifestyle choices of these physicians might reflect a lack of commitment to providing suitable lifestyle guidance to their patients. Given the limited research on NCD prevalence among healthcare workers in the UAE, further studies are essential to bridge this gap, assess the burden of NCDs, and develop targeted interventions to support the health of this vital workforce.

In the Middle East and North African Regions, NCDs account for 79% of all deaths, surpassing the global average of 74% [12]. A similar study conducted at a tertiary cancer hospital in Varanasi, India, revealed a high prevalence of NCD risk factors among the hospital's healthcare staff, with the highest levels observed among male employees [13]. A research study conducted at a medical university in Bangladesh found a significant association between risk factors and behavioral parameters such as tobacco usage, alcohol consumption, high salt intake, and physical inactivity among various categories of healthcare workers [14]. The prevalence study done among healthcare workers in China showed that persistent stress and/or recurrent anxiety or depressed mood was highest among individuals with a college or undergraduate degree (64.56%) [15]. Additionally, a study conducted among healthcare workers in central hospitals in Nepal reported a significant association, with 79.19%

experiencing moderate levels of stress and hypertension [16].

NCDs continue to pose a substantial challenge to public health and development in the UAE. The four major NCDs include cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases- contributing to 68.1% of all deaths and 17% of premature deaths (ages 30-70). Diabetes, with a prevalence of 15.4% (compared to the global prevalence of 9.3%), is among the top five risk factors. Other prevalent conditions include elevated levels of BMI, hypertension, and total cholesterol; as well as dietary hazards, which are often linked to irregular eating habits, sedentary lifestyles, or genetic factors [17]. Migrant workers may face additional risks due to prolonged exposure to lifestyle-related factors that contribute to NCDs. The interconnection between residency duration and the development of NCD risk factors highlights the importance of tailored health interventions [18].

The UAE Ministry of Health and Prevention (MOHAP) has implemented various initiatives to address local health conditions and combat non-communicable diseases (NCDs). These include integrating NCD screening and management into primary healthcare, launching awareness campaigns, and introducing excise taxes on tobacco and sugary drinks to reduce consumption. MOHAP has also promoted physical activity through initiatives like the "Dubai Fitness Challenge 30×30 " and encourage healthier eating habits with front-of-pack labeling policies. Additionally, the ministry has expanded digital health services and telemedicine to ensure continued access to healthcare, particularly during the COVID-19 pandemic [19, 20].

Preventive measures for NCDs should encompass not only the general population but also the healthcare workers. Effective health promotion necessitates a positive outlook among healthcare providers. Regular NCD screening, lifestyle modification such as leisure physical activities, and balanced diet consumption within the healthcare sector is essential to reduce absences and ensure a well-functioning healthcare system.

Despite the substantial burden of NCDs among healthcare professionals in other regions, there is limited research on this issue in the UAE. This study aims to assess the frequency and determinants of NCDs among healthcare workers in Ajman UAE. By identifying key risk factors, the study hopes to provide insights that may inform targeted integrated health promotion strategies, support workplace wellness initiatives, and contribute to a more sustainable healthcare workforce. The researchers have indicated that the conclusions could also serve as a foundation for future research, addressing gaps in knowledge and guiding policy recommendations tailored to healthcare providers' unique needs.

Methods

Study design, setting, and sampling

This cross-sectional study was conducted among 786 healthcare workers in tertiary care hospitals in Ajman, UAE. A convenience sampling technique was adopted to recruit the participants.

Inclusion criteria Healthcare workers aged 18 and above years old, of any gender and nationality.

Exclusion criteria Healthcare workers unwilling to provide informed consent or unavailable during data collection.

As per the government statistical record of 2022, there are a total of 4395 healthcare workers (962 physicians, 384 dentists, 782 pharmacists, 1545 nurses, and 722 allied medical professionals) [21].

The sample size calculation for this cross-sectional study was performed by inputting the respective values of the variables required in the formula:

where p stands for the disease prevalence either in percentage form or decimal form and L stands for the level of precision.

The value for q can be calculated by subtracting p from 100 if p is in percentage form, whereas if p is in decimal form, q can be calculated by subtracting p from 1.

Based on the study conducted [22], the available prevalence is 31%.

Therefore

To avoid non-response, 10% of the sample is added to avoid nonresponse. Hence, the total minimum sample required for the study is 895 + 90 = 985 = 1000.

This study employs convenience sampling, which is a non-probability sampling method for recruiting eligible study participants. Some of the eligible participants were on annual vacation. Hence, could not achieve the sample size.

Questionnaire development

A self-administered questionnaire assessed the prevalence of NCDs and associated factors among healthcare workers. A pilot test was conducted to time the data collection and understand the feasibility of the data collection. The questionnaire was developed based on a review of relevant literature and content validated by 3 public health experts. It consisted of five sections:

 Sociodemographic Variables: Meticulous collection of information on participants' age, gender, nationality, education level, marital status, medical insurance status, and medical care accessibility. Additionally, it encompassed metrics such as stature, body mass, occupation, frequency of weekly work shifts, and daily work hours [23].

- Lifestyle Factors: This segment was further reclassified into five categories [23]:
- **Tobacco Usage**: Participants provided detailed responses regarding the specific tobacco products utilized, age at onset, frequency and quantity of daily consumption, cessation status, and whether they retain tobacco quid intraorally for prolonged durations.
- Alcohol Consumption: The questions centered on participants' alcohol use status, consumption frequency, age at onset, and cessation history, if relevant.
- **Physical Activity**: Participants reported their physical activity status, types of activities, and frequency.
- **Dietary Habits**: This section incorporated diet type, meal frequency, timings, reasons for skipping meals, and the frequency of consumption of various dietary items like smoked food, fast food, salty food, fruits, vegetables, coffee, spicy food, carbonated beverages, energy drinks, red meat, and home-cooked food.
- Sleep Patterns: Participants provided details on sleep duration, habits over the past 30 days, use of electronic devices before bed, daytime sleepiness, restfulness upon waking, muscular pain, snoring, and continuity of sleep. They were also asked about the perceived benefits of adequate sleep and its role in preventing NCDs [24].
- **Perceived Stress Scale (PSS)**: This section used a standardized iteration of PSS to quantify the stress levels of the healthcare workers incorporating a series of 10 questions evaluating aspects such as unexpected stress, control over life, nervousness, confidence, coping ability, and feeling overwhelmed. Respondents provided answers on a Likert scale spectrum ranging from "Never" to "Very often," [25].
- **Personal History of Non-communicable diseases:** Participants were inquired about the presence of any NCDs, when they last followed up with a healthcare provider, and to specify if they suffered from any of the following conditions - diabetes, hypertension, cardiovascular disease, obesity, hyperlipidemia, cancer, asthma/respiratory diseases, gastro-esophageal reflux disease (GERD), arthritis, piles, gout, sciatica, musculoskeletal disorders, and thyroid disorders. Respondents were also asked to denote any chronic conditions they had beyond the predefined list [23].
- Family History of Non-communicable disease: Here, the participants gave insights into any familial predisposition to non-communicable disease they had. The respondents were guided to answer "yes" if they had a positive family history of any noncommunicable disease and "no" if they did not.

Those answering "Yes" were asked to specify their relationship with the affected family member and the disease in question [26].

Data collection procedure

This research was approved by the Institutional Review Board of a Medical University (IRB-COM-STD-25-JAN-2024) in Ajman, UAE. The data collection instrument used in this study was a selfadministered questionnaire developed by the researchers after reviewing relevant medical literature on the topic. It was administered in English, and participants required approximately 5-7 min to complete the form. The study was conducted in compliance with the Helsinki Declaration. The completed responses were compiled into a Microsoft Excel file and subsequently transferred to IBM SPSS Version 29.0 for analysis. The researchers approached eligible participants, aged 18 and above years, at 5 hospitals in Ajman, who explained the purpose of the study and obtained informed consent from those willing to participate. Confidentiality and Anonymity were ensured as no identifying information was requested from the respondents.

Statistical analysis

Data analysis was conducted in April 2024 using IBM° Statistical Package for Social Sciences (SPSS) (version 29.0). The number of respondents originally invited is 1000, and the response rate is 78.6%. There are no missing data and no forms were eliminated from the data analysis. Descriptive statistics were utilized to summarize categorical data, while chi-square tests assessed the association between self-reported NCD frequency and factors such as socio-demographics, lifestyle, and family history of chronic diseases. Logistic regression was employed to assess the predictors of NCD. The Perceived Stress Scale (PSS) score was computed by summing the responses (ranging from 0 to 4) to 10 items, applying reverse scoring to positively stated questions, and then categorizing the total score (ranging from 0 to 40) into stress levels: Low Stress (0-13), Moderate Stress (14-26), and High Stress (27-40). A p-value of less than 0.05 was deemed statistically significant.

Results

A total of 786 responses were collected from participants, with an average age of 35.04 ± 9.93 years. The majority of respondents were female (63.5%), with most belonging to the Southeast Asian Region (72.1%). The other regions include the African Region(AFR), Region of the Americas (AMR), European Region (EUR), Eastern Mediterranean Region(EMR), and Western Pacific Region(WPR). A significant proportion of participants were married (70%), and the majority held at least a bachelor's degree (67.6%).

Variable	Group	No.	%
Age groups	<40 years	575	73.2
	>=40 years	211	26.8
Gender	Male	287	36.5
	Female	499	63.5
Nationality (WHO	Southeast Asia Region	567	72.1
region wise)	Others	219	27.9
Marital status	Married	550	70
	Single	236	30
Occupation	Healthcare professionals	492	62.6
category	Others	294	37.4
Level of education	Higher-secondary and below	97	12.3
	Bachelor's degree	531	67.6
	Master's and above	158	20.1

Table 1 Distribution of participants according to the Sociodemographic characteristics

Healthcare professionals (Doctors, dentists, medical interns, and nurses) made up 62.6% of the sample across various occupational categories. The category included paramedical, lab technicians, administrative staff, housekeeping staff, office staff, pharmacists, and physiotherapists. Table 1 provides a detailed summary of the socio-demographic characteristics of the participants:

Among the healthcare workers surveyed, 35% (273 participants) reported having at least one NCD, while the remaining 65% (513 participants) did not report any NCDs. Of the healthcare workers who participated in the survey, 44% (347 participants) maintained normal BMI levels, while 56% (439 participants) had abnormal BMI levels. Class I, II, and III of the abnormal BMI classifications included underweight, overweight, and obesity.

The bar graph presented in Fig. 1 offers a comprehensive breakdown of the frequency of various NCDs among the healthcare workers surveyed. According to the reported history of NCDs, the most common condition was hypertension, affecting 64(14.16%) of respondents. This was followed by hyperlipidemia, affecting 59(13.05%), and diabetes, which affected 58(12.83%). Musculoskeletal disorders were reported by 51(11.28%) of the respondents, while 46(10.18%) were classified as obese. thyroid disorders were present in 41(9.07%), and GERD affected 33(7.30%). Other notable diseases included asthma 30(6.64%) and arthritis 25(5.53%). Sciatica was reported by 17(3.76%), while piles affected 11(2.43%). Gout was observed in 9(1.99%) of the respondents, and cardiovascular disease was reported by 7(1.55%). The least prevalent condition was cancer, affecting just 1(0.22%).

Table 2 presents the association between the history of NCDs and socio-demographic characteristics among the study participants. The analysis identified significant associations between age groups and the frequency of NCDs (p < 0.001). Specifically, individuals aged 40 years and older (56.9%) were more likely to report NCDs compared to those under 40 years (26.6%). Gender did not show a significant association with NCD prevalence, with 38.0% of males and 32.9% of females reporting NCDs. Similarly, marital status and occupation category did not demonstrate significant associations with the frequency of NCDs. However, nationality categorized by WHO regions demonstrated a significant association (p=0.031), with individuals from the South-East Asia Region reporting higher rates of NCDs (32.5%) compared to other regions (40.6%). Education level also showed a significant association with NCD frequency (p < 0.001). Participants with a master's degree or higher exhibited the highest frequency of NCDs (49.4%), followed by those with a bachelor's degree (30.9%), and those with a higher-secondary education or below (32.0%).

Table 3 presents the association between the history of NCDs and various lifestyle-related factors among the study participants. A significant association was found between the BMI levels and NCD frequency(p < 0.001).



Fig. 1 Distribution of participants according to the type of non-communicable disease

Variable	Group	Non-communicable diseases				Р
		Yes	Yes			
		No.	%	No.	%	
Age groups	<40 years	153	26.6	422	73.4	< 0.001
	≥40 years	120	56.9	91	43.1	
Gender	Male	109	38	178	62	0.147
	Female	164	32.9	335	67.1	
Marital status	Married	201	36.5	349	63.5	0.103
	Single	72	30.5	164	69.5	
Occupation category	Healthcare professionals	167	33.9	325	66.1	0.547
	Others	106	36.1	188	63.9	
Nationality	Southeast Asia Region	184	32.5	383	67.5	0.031
(WHO Region wise)	Others	89	40.6	130	59.4	
Level of education	Higher-secondary and below	31	32	66	68	< 0.001
	Bachelor's degree	164	30.9	367	69.1	
	Master's and above	78	49.4	80	50.6	

Table 3 Association between history of Non-Communicable diseases and Lifestyle-related factors

Lifestyle-related factors	Group	Non-communicabl		icable diseases		
		Yes		No		
		No.	%	No.	%	
BMI levels	Normal	84	24.2	263	75.8	< 0.001
	Abnormal	189	43.1	250	56.9	
Tobacco use	Yes	19	33.3	38	66.7	0.818
	No	254	34.8	475	65.2	
Alcohol consumption	Yes	23	41.1	33	58.9	0.200
	No	250	34.2	480	65.8	
Physically active	Yes	221	34.1	428	65.9	0.383
	No	52	38	85	62	
Type of physical activity	Cardiovascular/Aerobic Activities	184	35.7	331	64.3	0.042
	Strength Training	21	22.9	81	77.1	
	Flexibility and Mind-Body Practices	12	42.9	16	57.1	
	NA	52	38	85	62	

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Table 4 Association between history of Non-Communicable diseases and family history of chronic diseases
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Variable	Group	Non-comm	Non-communicable diseases				
		Yes		No			
		No.	%	No.	%		
Family history of NCDs	Yes	215	37.9	352	62.1	0.003	
	No	58	26.5	161	73.5		

Individuals with abnormal BMI exhibited a higher frequencyof NCDs (43.1%) compared to those with normal BMI (24.2%). However, no significant association was observed between tobacco use and NCD prevalence, with 33.3% of tobacco users and 34.8% of non-users reporting NCDs. Similarly, alcohol consumption did not show a significant association with NCD prevalence. Among the participants, 41.1% of alcohol consumers and 34.2% of non-consumers reported NCDs. Moreover, neither overall physical activity nor specific types of physical activity—such as cardiovascular/aerobic activities, strength training, flexibility exercises, and mind-body practices—demonstrated significant associations with NCD prevalence. These findings suggest that while BMI levels significantly influence NCD prevalence, tobacco use, alcohol consumption, and general physical activity levels do not show statistically significant associations in this study population.

Table 4 portrays the association between the history of NCDs and family history of chronic diseases among the study participants. A significant association was found between having a family history of NCDs and the frequencyof NCDs among participants (p = 0.003). 37.9% of individuals with a family history of NCDs reported

having NCDs themselves, compared to 26.5% of those without a family history of NCDs. Furthermore, 62.1% of participants with a family history of NCDs did not report having NCDs, while 73.5% of those without a family history of NCDs were also free from NCDs.

Table 5 explores the association between the history of NCDs and different levels of perceived stress, as measured by the Perceived Stress Scale (PSS). Among individuals with low perceived stress, 22 (37.9%) had a history of NCDs, while 36 (62.1%) did not. In the moderate perceived stress category, 217 (33.7%) had a history of NCDs, compared to 427 (66.3%) who did not. For individuals experiencing high perceived stress, 24 (50%) had a history of NCDs, while the remaining 24 (50%) did not. Thus, the association between perceived stress levels and NCD history was not statistically significant (NS).

Table 6 examined the association between a history of NCDs and various diet-related factors. Among individuals with a mixed diet, 262 (35.1%) had a history of NCDs, while 484 (64.9%) did not, with no statistically significant association. Similarly, for participants following other types of diets, 11 (27.5%) reported having NCDs, while 29 (72.5%) who did not, also showed no significant association. Individuals who skipped meals had a higher prevalence of NCDs (163, 36.8%) compared to those who did not skip meals (110, 32.1%). However, this association was not statistically significant (NS). In contrast, a significant association was found between the consumption of salty food and NCDs (p = 0.035). Among individuals who never consumed salty food 56 (43.4%) had NCD, while 73 (56.6%) did not. Among those consuming salty food less than 4 days per week 95 (30.5%) had NCDs, while 216 (69.5%) did not. From individuals consuming salty food 4 or days more per week, 122 (35.3%) had NCDs, while 224 (64.7%) did not. Consumption of spicy food also showed a significant association with NCDs (p = 0.001). Among individuals who never consumed spicy food 43 (52.4%) had NCDs, while 39(47.6%) did not. Among those consuming it less than 4 days per week 52 (36.9%) had NCDs, while 89 (63.1%). Among individuals consuming spicy food 4 or more days per week 178 (31.6%) experienced NCDs, while 385 (68.4%) did not.

Table 7 demonstrates the association between the history of NCDs and various sleep habits among the study participants. A significant association was found between sleeping 6–8 h per night and NCD prevalence

(p=0.003). Individuals who slept 6–8 h per night had a lower prevalence of NCDs (33.30%) compared to those who did not (52.60%). No significant association was observed between the use of electronic devices before sleep and NCD prevalence. Among respondents who used electronic devices, 34.10% reported NCDs, while 31.00% of those who did not use electronic devices had NCDs as well. Feeling sleepy during the daytime was significantly associated with NCD prevalence (p=0.020). A higher percentage of individuals who felt sleepy during the daytime had NCDs (37.60%) compared to those who did not feel sleepy (29.80%). A significant association was observed between feeling well-rested upon waking and NCD prevalence (p = 0.026). Individuals who did not feel well-rested upon waking had a higher prevalence of NCDs (46.20%) compared to those who did feel wellrested (33.50%). Waking up with muscular pain was significantly associated with NCD prevalence (p < 0.001). Individuals who woke up with muscular pain had a higher prevalence of NCDs (45.30%) compared to those who did not (25.40%). A strong association was identified between snoring during sleep and the prevalence of NCDs, with a statistically significant p-value of less than 0.001. A higher percentage of individuals who snored had NCDs (48.00%) compared to those who did not snore (25.40%). Finally, getting continuous sleep for at least 6 h and NCD prevalence were also significantly.

associated (p = 0.013). Individuals who did not get continuous sleep for at least 6 h had a higher prevalence of NCDs (46.20%) compared to those who did (33.40%).

Table 8 presents the risk estimates for significant demographic, lifestyle, and sleep factors with the frequency of non-communicable diseases (NCDs). Age groups, BMI levels, family history of NCDs, waking up with muscular pain, and snoring are identified as significant risk factors (p < 0.05) Other factors like nationality, level of education, sleep duration (6-8 h of sleep per night), feeling sleepy during the day, feeling well rested when waking up, and getting continuous sleep for at least 6 h are not significant predictors for the occurrence of NCD. Age is the major factor linked with the frequency of NCD among healthcare workers with AOR 2.82 (CI 1.93-4.12, p < 0.001). Additionally, Individuals with abnormal BMI are at 2.15 times more risk than those with normal BMI. Individuals with a family history of chronic disease are 1.91 (CI 1.3–2.8, p = 0.001) more likely to have NCDs

Table 5 Association between history of NCD and different stress levels according to PSS score

Variable	Group	Non-com	Non-communicable diseases				
		Yes		Νο			
		No.	%	No.	%		
Category of stress	Low Perceived Stress	22	37.9	36	62.1	0.066	
	Moderate Perceived Stress	217	33.7	427	66.3		
	High Perceived Stress	24	50	24	50		

Diet-related factors	Group	Non-communicable diseases			Р	
		Yes		No		
		No.	%	No.	%	
Type of Diet	Mixed	262	35.1	484	64.9	0.324
	Others	11	27.5	29	72.5	
Skip meals	Yes	163	36.8	280	63.2	0.168
	No	110	32.1	233	67.9	
Smoked food	Never	113	36.50	197	63.50	0.736
	<4 days	128	33.30	256	66.70	
	>=4days	32	34.80	60	65.20	
Fast food	Never	64	36.20	113	63.80	0.301
	Less than 4 days	166	35.90	296	64.10	
	Greater than or equal to 4days	43	29.30	104	70.70	
Salty food	Never	56	43.40	73	56.60	0.035
	Less than 4 days	95	30.50	216	69.50	
	Greater than or equal to 4days	122	35.30	224	64.70	
Fruits	Never	5	38.50	8	61.50	0.071
	Less than 4 days	51	44.00	65	56.00	
	Greater than or equal to 4days	217	33.00	440	67.00	
Vegetables	Never	2	22.20	7	77.80	0.061
	Less than 4 days	44	44.90	54	55.10	
	Greater than or equal to 4days	227	33.40	452	66.60	
Coffee/tea	Never	19	32.20	40	67.80	0.392
	Less than 4 days	29	42.00	40	58.00	
	Greater than or equal to 4days	225	34.20	433	65.80	
Spicy food	Never	43	52.40	39	47.60	0.001
	Less than 4 days	52	36.90	89	63.10	
	Greater than or equal to 4days	178	31.60	385	68.40	
Beverages	Never	140	32.10	296	67.90	0.132
	Less than 4 days	92	36.40	161	63.60	
	Greater than or equal to 4days	41	42.30	56	57.70	
Energy drink	Never	225	33.90	439	66.10	0.360
	Less than 4 days	29	36.70	50	63.30	
	Greater than or equal to 4days	19	44.20	24	55.80	
Red meat	Never	57	37.50	95	62.50	0.710
	Less than 4 days	106	33.70	209	66.30	
	Greater than or equal to 4days	110	34.50	209	65.50	
Homecooked food	Never	14	46.70	16	53.30	0.263
	Less than 4 days	25	39.10	39	60.90	
	Greater than or equal to 4days	234	33.80	458	66.20	

Table 6 Association between history of Non-Communicable diseases and Diet-related	factors
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than those who do not have a family history. Individuals who wake up with muscular pain are 1.84 (CI (1.3–2.6, p < 0.001) times more likely to have had NCDs than the ones who don't. Individuals who snore are 1.86 ((1.31–2.62, p < 0.001) more likely to have had NCDs than those who do not snore.

Discussion

The research findings offer valuable insights into the frequency of NCDs among healthcare workers. The study, which included 786 participants, identified several associations between socio-demographic characteristics, lifestyle factors, family history of chronic diseases, stress levels, diet-related factors, and sleep habits with the frequency of NCDs.

In this study, the frequency of NCDs among healthcare workers was found to be more one one-third, which is higher than the 29.4% reported in a study among nursing professionals at a charitable hospital in South Brazil [27]. Additionally, a study involving 6,848 healthcare workers across four sub-Saharan African countries reported lower frequency rates of chronic diseases: 9.7% in Nigeria, 11.8% in the Democratic Republic of Congo, 13.5% in Côte d'Ivoire, and 20.6% in Madagascar [28]. The variation in frequency observed across different studies can be attributed to factors such as differences in healthcare

Sleeping habits	Group	Non-com	Non-communicable diseases			
		Yes	Yes		Νο	
		No.	%	No.	%	
I sleep between 6–8 h per night	Yes	243	33.30	486	66.70	0.003
	No	30	52.60	27	47.40	
I use electronic devices before going to sleep	Yes	249	35.10	460	64.90	NS*
	No	24	31.20	53	68.80	
I feel sleepy during the daytime	Yes	195	37.60	324	62.40	0.020
	No	78	29.20	189	70.80	
I feel well-rested when I wake up	Yes	237	33.50	471	66.50	0.026
	No	36	46.20	42	53.80	
I usually wake up with muscular pain	Yes	167	45.30	202	54.70	< 0.001
	No	106	25.40	311	74.60	
l snore during sleep	Yes	156	48.00	169	52.00	< 0.001
	No	117	25.40	344	74.60	
l get continuous sleep for at least 6 h	Yes	230	33.20	463	66.80	0.013
	No	43	46.20	50	53.80	

 Table 7
 Association between history of Non-Communicable diseases and sleeping habits

systems, working conditions, and lifestyle factors among healthcare workers in various regions.

Results from the study indicate that healthcare workers without a family history of NCDs have a 73.5% reduced risk of developing these conditions. This finding is consistent with similar research at a secondary healthcare facility in Ghana, where individuals without a family history of NCDs were 30% less likely to suffer from them, emphasizing the impact of genetic factors on the risk for NCDs [26]. This trend was also observed in a study conducted among healthcare workers in the Gaza Strip, Palestine where 67% of participants reported having a family history of NCDs [29].

The study identified a 14.2% frequency of hypertension, which surpasses the 5.4–11.3% range reported in other studies across sub-Saharan Africa [28]. In contrast, a study from a tertiary cancer hospital in Varanasi, India, reported a higher frequency of 17.0%, which likely reflects the increased stress levels among the healthcare workers. The frequency of diabetes in this study is 12.8%, greater than the globally age-adjusted prevalence of 9.8%, it is also markedly higher than the 6.43% observed in the tertiary cancer hospital, indicating potential issues with diabetes management [10, 13]. Moreover, the dyslipidemia rate of 13.05% closely aligns with the 12.5% reported in the study conducted in Varanasi. These results underscore significant regional health disparities and the necessity for targeted health interventions [13].

The study showcased a significant association between participants aged 40 and above and the frequency of NCDs. This resonates with the national data showing a 19% mortality probability from NCDs for those aged 30–70, pointing out the critical impact of age on NCD frequency and outcomes [30]. Another notable finding is that 56.9% of those aged \geq 40 years are affected by

NCDs, supported by the Nepalese STEPs Survey 2019, which found higher NCD risk factors in older age groups [31]. Both studies emphasize the need for early intervention and age-specific prevention strategies. This association was also reflected in a multi-country cross-sectional study conducted in sub-Saharan Africa among healthcare workers [28]. In our study, 43.1% of healthcare workers had abnormal BMI, a lower prevalence compared to the 70% reported among physicians in Saudi Arabia. This difference suggests that our participants may have greater awareness of healthy practices, highlighting the potential impact of lifestyle education and workplace wellness initiatives [11]. The significant association between abnormal BMI levels and the frequency of NCDs underscores the impact of body weight on the development of these diseases. This finding aligns with research conducted among South African healthcare workers, where the prevalence of abnormal BMI was reported at 42.1% [28].

The Southeast Asia Region exhibited an NCD frequency of 32.5%, compared to all other regions, suggesting that regional factors such as lifestyle and genetics may influence NCD rates. This might also be due to the higher population of healthcare workers from Southeast Asian nations in the hospitals where we recruited the participants. Additionally, individuals with a master's degree or higher showed a higher NCD frequency of 49.4%. This could be attributed to occupational stress, sedentary lifestyles, and other related factors commonly associated with higher education. While higher education is often linked to better health awareness and more frequent check-ups, it can also expose individuals to elevated risks. This contradicts a study among middle-aged Japanese which shows lower education levels are more associated with NCD prevalence, especially diabetes, hypertension, and hyperlipidemia [32].

Table 8	Bivariate and multivariate regression between
significar	nt associated factors and NCD prevalence

Variable	Group	Crude OR (Cl 95%)	Adjusted OR (Cl 95%)	P- value (Ad- justed)
Age groups	≥40 years	3.63 (2.61–5.05)	2.82 (1.93– 4.12)	< 0.001
	< 40 years	1	1	-
Nationality((WHO Region wise)	Others	1.42 (1.03–1.96)	1.17 (0.81– 1.69)	0.387
	Southeast Asia Region	1	1	-
Level of education	Higher-sec- ondary and below	1	1	_
	Bachelor's degree	0.95 (0.59–1.51)	1 (0.6–1.67)	0.984
	Master's and above	2.07 (1.22–3.52)	1.59 (0.88– 2.87)	0.12
BMI levels	Abnormal	2.36 (1.73–3.22)	2.15 (1.53– 3.03)	< 0.001
	Normal	1	1	-
Family history of NCDs	Yes	0.58 (0.41–0.82)	0.52 (0.35– 0.76)	0.001
	No	1	1	_
l sleep between 6–8 h per night	No	2.22 (1.29–3.82)	1.72 (0.86– 3.42)	0.122
	Yes	1	1	_
I feel sleepy during the daytime	Yes	0.68 (0.49–0.94)	1.23 (0.84–1.8)	0.268
	No	1	1	-
l feel well-rested when I wake up	No	1.7 (1.06–2.73)	1.66 (0.95– 2.88)	0.071
	Yes	1	1	-
l usually wake up with muscular pain	Yes	2.42 (1.79–3.27)	1.84 (1.3–2.6)	< 0.001
	No	1	1	-
I snore during sleep	Yes	2.71 (2–3.67)	1.86 (1.31– 2.62)	< 0.001
	No	1	1	-
l get continuous sleep for at least 6 h	No	1.73 (1.11–2.68)	1.62 (0.92– 2.85)	0.093
	Yes	1	1	-

Higher salty food consumption (≥ 4 days/week) and no consumption of salt were significantly associated with NCD prevalence (p = 0.035), while the lowest NCD rate was observed in those consuming it moderately (<4 days/week). The frequency of NCDs among healthcare workers who consume salt more than 4 days a week in the study is 35.3%, closely affirming the 35.6% reported in a referenced Bangladeshi study. People with moderate salt consumption (less than 4 days per week) had a lower frequency of NCDs (35.3%) compared to those who did not include salt in their diet (43.4%) [14]. This corresponds to the study done among participants suffering from type 2 diabetes, where the highest mortality risk was observed in individuals with the lowest salt intake [33]. WHO recommends salt intake of less than 5 g of salt per day [34]. This similarity suggests consistent dietary patterns concerning salt consumption among healthcare professionals across different contexts, highlighting the need for targeted nutritional interventions in this demographic population. Previous research in Bangladesh found a highly significant association (p < 0.001) between tobacco use, alcohol intake, added salt intake, physical inactivity, and health profession categories, accentuating a close link. In contrast, our study only found a significant association with salt intake (p = 0.035). Tobacco use, alcohol intake, and physical inactivity did not show significant associations, possibly due to variations in sample populations, regional lifestyles, or health behaviors [14]. The 7.25% tobacco use frequency in our study is lower than the national average of 9.3% reported by the WHO [35]. This reduction likely results from enhanced public health initiatives, increased awareness of tobacco's health risks, and stricter regulations, reflecting a positive trend in reducing tobacco consumption.

It was found that individuals who never consumed spicy food had a higher frequency of NCDs at 52.4%, compared to 31.6% who consumed spicy food more than four days a week. This is consistent with a study by Lv et al. (2015), which reported that participants who consumed spicy foods six or seven days a week had a 14% relative risk reduction in total mortality compared to those who ate spicy foods less than once a week [36]. These findings suggest that frequent consumption of spicy foods may reduce the risk of NCDs.

Interestingly, stress levels were not significantly associated with the frequency of NCDs in contrast to the outcomes of multiple other studies [13, 28]. For instance, a prospective cohort study conducted on civil workers laid out an important link between work-related psychosocial stressors and metabolic syndrome [37]. These divergent findings suggest the need for further investigation into the complex relationship between stress and NCDs as well as the potential variations across different populations and healthcare settings.

To the best of our knowledge, this is the first study to analyze the association between sleeping habits and NCDs in healthcare workers. Previous studies have primarily focused on sleep quality without exploring the various dimensions of sleep habits [38, 39]. The findings indicate that certain sleep habits are significantly associated with NCD. Individuals who sleep between 6 and 8 h every night had a statistically significant association with NCD (p = 0.003) linked to increased risk for cardiovascular diseases [40]. Surprisingly, the use of electronic devices before going to sleep showed no statistical significance, although many studies do indicate that it results in poorer sleep quality [41]. Daytime sleepiness was more common in individuals with NCD (p = 0.020), suggesting poor sleep quality. Not feeling well-rested upon waking also demonstrated a significant relationship with NCD (p = 0.026). Those without NCDs reported feeling more well-rested than their counterparts, strengthening the connection between sleep restoration and long-term health outcomes. Chronic sleep disruption in otherwise healthy individuals has been linked to hypertension, dyslipidemia, cardiovascular disease, metabolic syndrome, weight-related issues, and type 2 diabetes mellitus [42]. The association between waking up with muscular pain and NCDs was highly significant (p < 0.001), possibly due to chronic inflammation and musculoskeletal issues. This suggests a vicious cycle, where sleep deprivation leads to pain, and pain further exacerbates poor sleep [43]. Finally, snoring during sleep (p=0.001) and the ability to sleep continuously for at least six hours (p = 0.013) were both significantly associated with NCDs. Studies have shown that habitual snoring increases the risk of stroke by 26% and the risk of coronary heart disease by 15% [44]. Additionally, the inability to sleep continuously for six hours is linked to sleep disruption disorders, which have considerable adverse short- and long-term health effects [42]. These results underline the importance of sleep habits in the management and prevention of non-communicable diseases among healthcare workers, who are exposed to irregular work shifts, increased stress and reduced productivity which further aggravate sleep related problems.

Overall, the study provides noteworthy insights that can influence future interventions and healthcare policies aimed at promoting the well-being of healthcare professionals and reducing the burden of NCDs in this population.

Limitations

The study has several limitations, firstly it was limited to a Tertiary care hospital in the emirate of Ajman, thus restricting the generalizability of the findings in other emirates of the UAE. Additionally, since the data was self-reported by healthcare workers, there is a potential for recall bias and underreporting of lifestyle factors such as weight, alcohol, and tobacco use, as well as personal and family history of diseases, which were not verified, potentially affecting the study's reliability and validity. There is also a possibility of selection bias because data collection took place during working hours, which may have resulted in a preference for participants who were not actively engaged in work at the time. This could have influenced the findings, as those who were busier might have different health profiles compared to those who had more time to participate.

Conclusion

The study found that more than one-third of participants had at least one non-communicable disease (NCD), with hypertension (14.16%), hyperlipidemia (13.05%) and diabetes (12.83%) being the most common. More than half of the participants had abnormal BMI, underweight, overweight, and obese (Classes I, II, and III). Those aged \geq 40 years (56.9%) had higher NCD frequency than those < 40 years (26.6%) and those from Southeast Asia (32.5%) had lower NCD rates than other regions (40.6%). Higher education level was associated with higher NCD frequency, 49.4% of those with a Master's degree or more had NCDs. Abnormal BMI was associated with higher NCDs (43.1%) than normal BMI (24.2%). Tobacco, alcohol, physical activity, and diet type showed no association, According to the results, both salty and spicy food consumption were linked to a lower prevalence of NCDs among healthcare workers. 37.9% of those with a family history of NCD had NCDs compared to 26.5% without a family history. These findings suggest age, education, BMI, dietary habits and family history are the determinants of NCDs and we need to target healthcare workers in Ajman, UAE.

Recommendations

The recommendations include developing health programs specifically designed for older healthcare workers, focusing on regular screenings, chronic disease management, and preventive care. Educational initiatives should be enhanced to increase NCD awareness, stress on regular check-ups, and early detection. Programs promoting healthy weight management through nutrition counselling, weight loss initiatives, and physical activity are essential. Dietary modifications should be encouraged, including guidelines for salty and spicy food daily for a balanced diet. Raising awareness about familial predisposition and the risk for NCDs and encouraging individuals to seek regular medical advice as well as adopting healthier lifestyles should be prioritized. Workplace wellness programs addressing stress management, mental health, and strategies to improve sleep quality and reduce daytime sleepiness should also be implemented. Additionally, conduct ongoing research and regular monitoring to track the effectiveness of these interventions and adjust strategies as needed to continually improve health outcomes.

Abbreviations

BMI	Body Mass Index
GCC	Gulf Cooperation Council
GERD	Gastro-Esophageal Reflux Disease
NCD	Non-Communicable Diseases
PSS	Perceived Stress Scale
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

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Author contributions

Authors' contributions STS contributed to the study design, data collection, data analysis, data interpretation, and drafting and reviewing of the manuscript. ASMH and ALC contributed to data collection, data analysis, data interpretation, and drafting and reviewing of the manuscript. AR contributed mainly to data collection, data analysis, and reviewing of the manuscriptSKF, JCJ, and MNS contributed to data collection, and reviewing of the manuscript. JM and JS contributed to the study design, data analysis, data interpretation, critical review of the manuscript, and supervision of the work. EME contributed to the supervision and review of the manuscript.All authors read and approved the final manuscript.

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Data availability

The dataset is uploaded as a supplementary file.

Declarations

Ethics approval and consent to participate

This study was approved by the Institutional Review Board of Gulf Medical University in Ajman, United Arab Emirates (Ref. no. IRB-COM-STD-25-Jan-2024). Informed consent was obtained from all the participants involved in the study. The study was conducted in compliance with the Helsinki Declaration.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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